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Science Homework and Parental Involvement: Factors Influencing Behaviors and Attitudes

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Introduction

The purpose of this study is to understand confounding information regarding homework and school achievement. Recent research has sought to identify specific factors impacting student success as it relates to homework including parental involvement, parental education, gender, socio-economic status, computer and internet use, extra-curricular activities, and other factors. Unfortunately, the results of these studies have lacked consensus. The review of the literature shows attempts have been made to isolate co-variables along with important factors such as gender, parental involvement, and student characteristics, but the results have been unclear. This study utilized a qualitative design with interviews, observations, and collection of artifacts to attempt to isolate and understand possible factors influencing homework among seventh grade, high achieving science students and address the gaps in the literature. Interviews with teachers, parents, and students were designed to learn from these varying perspectives possible relationships or similarities that may lead to a better understanding of the relationship between parental involvement, gender, homework, and school achievement.

Related Literature

Gender Differences

High achieving students, that is students that succeed in school as demonstrated by superior grades (i.e., all A's) are found among both boys and girls, and stereotypical assumptions of gender differences have been perceived as important co-variate with other factors in determining these high achieving students. Instead, research indicates that gender as a variable provides mixed results. Mau and Lynn (2000) found in the National Education Longitudinal Study (NELS) data that gender seemed to be a factor in homework and test scores along different subjects. Boys had higher scores in math and science while girls excelled in reading. Girls tended to spend more time doing homework than boys, and the authors found a higher correlation for girls between amount of time doing homework and test scores. The authors suggested that socialization explains the difference in time spent on homework between the genders, and differences in test scores simply confirm previous data found in earlier research. According to the authors, girls are socialized to be more thorough with their work, and homework seems to be important to their success in school. For boys, success in science and math seems to be easier.

The Mau & Lynn study could not address information that was not collected in the NELS data. For

instance, what motivations or purposes do students hold for doing homework? Xu (2005) found gender differences in a recent study regarding purposes for doing homework. This study was conducted to examine the perceived purposes for doing homework by 920 fifth to eighth grade students. Eight homework purposes were reduced to 2 factor structures (Intrinsic reasons and Extrinsic reasons for completing homework). A survey was administered to the participants in three rural, southern schools. The survey included the 8 statements that related reasons for doing homework. These statements ranged from reinforcing school learning and developing a sense of responsibility and good discipline to gaining adult and peer approval. Principal component factor analysis was the chosen method of extraction with a varimax rotation used to facilitate interpretation. This study addressed homework at the middle school level.

Debacker and Nelson (2000) examined the motivation differences among high school science students based on gender, science class type (biological or physical science), and ability level. The participants were in grades 10-12 and enrolled in biology ($n = 91$), accelerated chemistry ($n = 76$), physics ($n = 53$), or advanced placement physics ($n = 22$). Each subject was taught by a different instructor although similar instructional methods were employed, and all classes were taught based on a three-phase learning cycle (exploration, labeling, and concept application). Data were collected using Likert-type instruments on a 5-point scale that measured learning goals, performance goals, pleasing the teacher, perceived instrumentality, perceived ability, perceived task difficulty, intrinsic value, utility value, and attainment value. Using an analysis of variance, the gender main effect was found to be significant, $F(1,232) = 29.96$, $p < .000$ as well as the achievement level main effect, $F(1,232) = 5.04$, $p = .026$. Boys were found to have higher means on stereotyped views of science than girls, and lower achieving students had higher means on stereotyped view of science than did their high achieving peers. In addition, boys had higher means on perceived ability while girls had higher scores on pleasing the teacher, perceived instrumentality, and perceived task difficulty. Gender was not found to interact significantly with achievement level for any variable.

As with Xu's research, results of the data analysis indicated intrinsic reasons and extrinsic reasons for doing homework related positively to students' use of homework management strategies. The factor for intrinsic reasons was related to lower frequency of incomplete homework and to higher self-reported grades. Further, older students and students not receiving homework help were more likely to deny doing homework for extrinsic reasons. Also, the effect of homework help on intrinsic reasons was only apparent among boys.

Along with motivation or purpose for doing homework, methods of completing homework and the relationship to grade point average seems to be related to gender in unique ways. Sawyer et al. (2005) found gender differences regarding use of the computer and internet for homework purposes and grade point average (GPA). Among 101 students studied, the authors found a significant difference in GPA with the girls averaging 3.07 and the boys averaging 2.52 based on a 4.0 scale. In comparison of after school activities, girls estimated using the telephone 8.77 hours per week while boys used the telephone only 2.48 hours per week. The authors did find a negative correlation between GPA and telephone use. Of those studied, the girls spent more time doing homework at 4.88 hours per week while boys spent 3.27 hours per week, but the authors found no correlation between GPA and homework time spent. In use of the computer, boys and girls used the computer about the same, but the girls tended to use the computer more for homework at 2.63 hours per week and boys for 58 minutes per week. At the same time, no correlation was found between GPA and time spent on the

computer. The authors found positive relationships between GPA and extra-curricular sports or club activities, but they found negative relationships between GPA and watching television and playing the stereo. Noted gender differences did not include correlations between GPA and time spent on homework.

Parental Involvement

Parental involvement includes the various activities parents perform around the function of their children completing homework assignments. This may involve direct, hands-on assistance to less directive, facilitative supervision of the homework process. The review of literature presents varied results regarding the benefits of parental involvement in homework activities. While some research argues that homework is beneficial from the perspectives of parents, students, and teachers, other research suggests there is no significant benefits resulting from receiving homework assistance at home. Mixed results for variables such as socio-economic factors or parent education level have only confused the findings more. Again, gender difference appears to be an important factor.

Carter and Wojtkiewicz (2000) analyzed the NELS data to learn about gender differences and parental involvement. Expecting to find that parents would be more engaged in the education of their sons, they found varied results. Even after controlling for academic factors, the authors found that girls engaged in school discussion with their parents more than boys and their parents had higher educational attainment expectations for their daughters than their sons. Also, parents were more likely to attend events involving their daughters than their sons, and parents tended to be more restrictive about the amount of time their daughters spent socializing than they were with their sons. On the other hand, the authors found that parents were more involved in the school on behalf of their sons than their daughters, and parents were more likely to check the homework of their sons than they were of their daughters. The authors concluded that parents generally are more involved with daughters than sons, but they also noted that the results of this study can be interpreted in different ways. They suggested that future research attempt to clarify the gender differences in parental motivation for involvement; in particular they suggested that interviews with parents may help identify any potential changes in parental motivation due to recent social circumstances.

Some research has found very positive perceptions of parental involvement in science homework. Shymansky (2000) demonstrated the effects of parental involvement in a hands-on science program. The Science PAL's (Parents, Activities, and Literature) Project utilized literature as the basis of home-based scientific inquiry and hands-on projects. Survey data were collected from children, parents, and teachers at the end of the one-year intervention. Using a Likert scale, the surveys assessed student and parent attitudes toward the use of literature in science instruction, parental involvement in at-home science enrichment, the school science program, and potential science careers. The Science PAL's Project resulted in the following: (1) increased parental involvement in at-home science activities, (2) teachers' appreciation of parents as an instructional resource, and (3) student perception of increased parental involvement as positive. With increased parental involvement, both students and teachers appreciated the role parents served, but motivation for parental involvement was not addressed in this study.

Homework is often found to be the link between school and home. While some parents view homework as an opportunity to become involved in their child's education, others view homework as a source of stress for the child and parent. In a study conducted by Zady and Portes (2001), eighty-nine seventh

graders and their mothers were invited to participate in a homework study. Participants came from a varied background some high achievers from affluent families, others low achievers from low socioeconomic families. The study tried to determine if low socioeconomic status played an important role in parents assisting their children with problem solving science skills. The mothers and children were given three homework problems to complete with each task increasing in difficulty. Zady and Portes concluded that the lower socioeconomic mothers' inability to help their children related directly to their own developmental level. Such actions stand in sharp contrast employed by mothers of the high achievers.

Zady and Portes' study showed that the gap in parents helping their children complete homework is not a matter of parents wanting or not wanting to help their children, nor is it a matter of their sharing common goal or purpose with their children or the educational system. The gap lies with the parent's inability to mediate the academic material. (Zady, & Portes, 2001).

Xu (2003) conducted a study to examine the relationship between family help and homework management strategies by 121 middle school students in New York City. The study also considered the relationship between student achievement and homework help. Specifically, five features of homework management were included in the survey. The features were setting an appropriate work environment, managing the time spent, and controlling attention, motivation, and potentially interfering emotions. The education level of the helper and grade level of the student were considered in the multivariate analysis of variance.

Results of the data indicated no statistically significant difference in achievement for those receiving homework help or not. Also, there was again no statistically significant difference regarding the relationship between helper's educational level and student achievement among those with helper's holding a bachelor's degree or not. The data analysis indicated that there was no significant relationship between standardized test scores and homework management as reported by the middle school students selected for this study. However, the results indicate that the nature of direction given by the helpers is more influential than the level of education indicating that all types of families can play a positive role in the homework process. Although the sample was from an urban setting, the high percentage of students receiving free lunch (74%) indicates a similarity with participants of the current study.

The multiplicity of factors and the confounding results of quantitative studies give reason to review the problem from a qualitative perspective. This study seeks to learn more about the relationship between gender, parental involvement, and homework among high achieving students. This approach may help to clarify the factors that may contribute to some of the apparent inconsistencies in the results of previous studies. Specifically, this study seeks to answer the following research questions:

- How do parent, teacher, and student perceptions differ regarding the purpose of science homework?
- Among high-achieving middle school science students, what characteristics of parental involvement in homework exist?
- Among high-achieving middle school science students, what factors influence parental involvement in homework (e. g., gender, socioeconomic status, age/developmental stage, parent

education level)?

Methodology

The research questions in this study were best investigated through case study methodology, therefore a qualitative approach was taken. Multiple independent case studies were conducted to provide an in-depth view of high-achieving, 7th grade science students in regards to characteristics of and factors influencing parental involvement, as well as parent, teacher, and student perceptions of the purpose of homework. This article addresses the findings of the case studies detailing information gathered through interviews of teachers, parents, and students, observations of homework sessions, and archival data collection.

Five case studies were completed. Each one involved interviews with one 7th grade science teacher, a high-achieving student from her class, and the parent responsible for assisting with homework; two observations of homework sessions per participant; and analysis of archival data from each participant. Student participants consisted of 3 males and 2 females all 13 years of age. Diverse ethnicities from middle to upper middle class homes were represented in this study. There was one African- American, one Taiwanese, and three Caucasians. In each case, the mother filled the role of homework facilitator.

Data Collection

Data for this study were collected from the following sources: (a) open-ended interviews with five 7th grade science teachers, a high-achieving student from each class represented, and the parent responsible for assisting with each student's homework; (b) two observations of homework sessions for each student; (c) collections of relevant documents.

Interviews

To answer the research questions, we conducted separate interviews with each of the participants in the early months of 2006. Each interview lasted approximately one hour and consisted of approximately 40 open-ended questions each. Interview questions included items such as describe your perspective of the role of homework in your students' education (teacher), child's education (parent), your education (student). The responses were compared and analyzed. A consistent framework of questions tailored to answer the research questions was used by each researcher, and individual follow-up questions were added as deemed necessary. The interview questions were aligned for data analysis purposes. The interviews were audio taped and subsequently transcribed yielding almost 200 pages of transcripts.

Observations

Due to the homework behaviors of the selected student participants, it became necessary for the researchers to conduct one of the two observations for his/her student in class, and each researcher conducted one observation in the student's home. Audiotapes, videotapes, and/or field notes were used to record the homework sessions. When transcribed, these observations yielded 60 pages of notes.

Documents

Several types of documents were examined for this study. These documents provided insight into the nature of homework assigned, policies driving homework assignments, and quality of homework produced by the participating students. Documents collected for this study included homework samples, district homework policies, reward slips, homework planners, and individual teacher homework policies. Nineteen documents were collected for this study.

Data Analysis

Data analysis was conducted simultaneously during the data collection process. Specifically, adjustments were made to the location of observations of homework sessions due to the fact that several of the participating students regularly complete homework in class.

The interview, observation, and archival data collected were arranged in matrices which highlighted major themes (domains) and sub-themes (dimensions) that commonly appeared in each aspect of data collection and addressed the research questions driving the study. Individual researchers completed the matrix for interviews, observations, archival data, and a compilation of his/her data. Matrices were then shared and analyzed by all researchers. Five major domains were identified with 3-4 dimensions for each. The first domain dealt with characteristics of parental involvement. Dimensions specified for parental involvement were academic assistance, management, and social and affective development. The second domain consisted of factors influencing parental involvement. Dimensions of this domain were gender, socioeconomic status, age/developmental stage, and parent(s) level of education. Next, the perceived purpose of homework was a domain with teacher, parent, and student being the dimensions. The characteristics of high-achieving students was the fourth domain. Independence, motivation, structure, and parental involvement were the dimensions associated with this domain. Lastly, characteristics of homework was a domain with frequency, duration, and quality as dimensions.

Trustworthiness and Researchers' Role

Triangulation, the use of multiple data-collection methods (e.g., interviews, observations, and archival data), was used as a means of validation for this study while constructing an overall picture of the cases involved. Additionally, peer examination was employed for the purpose of validation. Individual researchers reflected upon findings throughout the study in order to identify personal biases. Access to subjects was obtained through permission by the superintendents and principals involved, and the students were then recommended by the teachers.

According to Glesne (2006), research validity can be obtained through prolonged engagement with participants. Each case study involved approximately five hours of engagement with the participants through interviews and observations which contributes to the reliability of the study. The entire process of group collaboration to develop the research design along with individual data collection and data analysis, and group data analysis indicates validity and reliability.

Findings

The data presented in this study are aggregated from five separate case studies, each completed by

one member of the research team. Each researcher identified a high-achieving 7th grade student from a public middle school in the area. Four different middle schools from four separate school districts are represented. Of the five participants in this study, three are male and two are female. All of the participants are high-achieving (all A's on their report cards) 13-year olds who are currently in the 7th grade at public middle schools in Mississippi. Four of the five students were identified for the school's intellectually gifted program. While their individual maturity levels vary from immature to very mature when compared by their parents to their same-age peers, all five demonstrate high levels of internal motivation. There is some level of racial/ethnic diversity included in this study (60% Caucasian, 20% African American, 20% Asian).

In addition to individual demographic information, the researchers also gathered demographic information to help us understand potential external influences on student-level factors for high achievement (i.e., independence, motivation, and structure). All five participants come from two-parent households with annual incomes well above the state mean. They all have at least one sibling in the home and are of different birth orders. The parents of the participants have diverse levels of education, ranging from a high school diploma to a doctorate degree. Ten of the twelve parents have earned a bachelor's degree or higher. Interview and observation data reveal high levels of structure in all five homes as well as high parent expectations for achievement and success. For this sample, demographic factors that appear to influence student-level achievement factors such as independence, motivation, and structure include two-parent household, sibling(s), above-average income, high structure modeled in home, and high parent expectations since these factors were consistent among all participants.

Major Themes Emerging from Data Analyses

While the researchers began the study anticipating finding differences in parental involvement and in student achievement based on gender, the data do not substantiate that belief. According to Sam's teacher, "My first thought was that more females have their homework regularly, but then when I began to think about students individually I think there are about as many males as females that approach homework seriously." She went on to say that "I usually think of females as being more interested in academics at this age and males more interested in sports and being outside" but realized during the interview that no differences really existed. In interviews, neither Sam nor her mother saw any difference between the genders. According to Jay's teacher, "I don't see a gender difference; I see an academic performance difference." The researcher asked her to clarify this response, and she responded, "I see the high achieving students do more with homework." When asked how parental involvement differs between the genders, she replied "It doesn't."

Johnny's teacher indicated some belief in gender differences: "Really smart or bright girls I don't have a problem with that, they're going to do it whether they have to stay up all night long. The boys, um, the bright boys usually will do it and are very concerned if they don't get it done. I just think the girls are more conscientious about doing it. I just think they [girls] are more mature at this age." When gender differences were examined across case studies, no meaningful pattern emerged.

Three major themes, however, do emerge from the overall analyses of the data gathered from interviews with, observations of, and documents from each of the five participants in this study.

Theme 1: Style of Parental Involvement

First, the style of parental involvement appears to be an important factor in determining the characteristics of parental involvement in homework and in defining the factors that influence parental involvement in homework. The style of parental involvement evidenced by this study is facilitative supervision. This implies that the parents serve as facilitators rather than as directors of in-home learning. The key elements of facilitative supervision are the modeling of structure in the home; oversight of student activities, including homework; and the provision of learning resources in the home. One in-home observation demonstrates the combination of structure, expectation, oversight, and provision of resources that defines facilitative supervision:

At 4:15, the mother called the children into the house. Each child picked up his/her book bag and went to their place of study. The siblings set up to complete their homework in separate rooms (den, library, kitchen table) while Matthew set up in the dining room. All began unpacking their book bags. The dining room had an oblong table that would seat 12, a china cabinet, and a sideboard. On the sideboard were a computer, papers, pens, and pencils: evidence that Matthew had worked here in the past. Matthew began unpacking his book bag. It took him a good 10 minutes to pull everything out which ended up being a disorganized pile of notebooks, papers, and books. Matthew took the first 5 minutes organizing the pile. He sorted out a math sheet of problems, a science worksheet, and a hand-written paper of terms and dates for social studies.

Interviews with the parents of the five participants reveal the importance of structure in the home environment and link the responsibility for establishing and maintaining that structure to the parents. One parent asserted, "It's very important to have structure. It helps them with time management." Another parent added that they have "a set time each night to do their homework." Overall, the parents interviewed agreed that establishing set times for homework completion, minimizing distractions such as television, and finding a location for their child to work on homework that was both comfortable and conducive to studying helped to provide a structure in the home that facilitated good homework habits.

The teachers interview responses support the need for structure in the home. One teacher stated, "Schedule, schedule, schedule. It all comes down to the parent scheduling the child and teaching them how to manage their time." Another teacher believes that high achieving students are self-driven but also believes that the structure taught at home is the driving force for that achievement. A third teacher offered the following recommendations for parents to add structure at home to support student achievement:

I would say, the first thing [when] they come home from school, find out what they have for homework, and just... keep track. They should have... a system, you know, it depends what your system might be. They might, you know, got to do their homework first before they can do anything else, or you know, maybe so many hours they should be apart... it depends on the weather. If it's gonna get dark soon, you know, okay, let them play until such and such time and then you do your homework. So there should be a schedule they will follow... that's what's needed.

The second important factor that defines facilitative supervision is oversight of student activities, including homework. In one observation of an at-home homework session, the parent did not sit with the child except to get the lesson started and then monitored throughout the session by asking probing questions to keep the student on task and to see how the homework was progressing. In an at-home

observation with a different participant, the researcher noted the following:

The mother provides oversight by reviewing the homework assignments and the strategies needed to perform the required tasks. She encourages him to complete his tasks in a timely fashion. She aids him in study/practice by reading spelling words and helped him create his homework planner which is a daily table of each subject where he places his assignment (i.e., study worksheet, spelling words, complete questions 1-20).

The final key element of facilitative supervision is providing the learning tools and resources in the home to support student success. In one interview, the researcher notes that the parents added the Internet at home at the request of the student so she could do her research from home. Another interview reveals that the parents provide a computer with Internet access, reference materials, and supplies for science projects. This was a common finding across the interviews and observations. In these families, at-home learning is a priority, and the parents provide resources and tools to facilitate the process. Each participant in this study has a computer with Internet access at home. Other commonly found materials in participants' homes include encyclopedias, books, periodicals, and general school supplies for project-based learning.

Theme 2: Characteristics of High-Achieving Middle School Students

The second theme that emerges from the analyses of the data gathered in this study is that high-achieving middle school students are characterized by three main qualities: independence, motivation, and structure. The following three factors were identified based on the interviews and observations conducted with the five participants by the research team: independence, motivation, and structure.

Interviews with the parents of all five participants substantiate the high level of independence exhibited by these high-achieving middle school students. When asked to describe her child, one parent responded:

Kathy is 12... well she just turned 13, and she's very mature... no behavior or discipline problems. I mean this child has not been punished in the last 12 years (laughter). Well occasionally, but no problems. Truthfully, she's very autonomous and just a good child... she's a very independent child. She likes to explore and find out on her own. That's not typical because I have two other children who are not that way (laughs). Kathy is the type child, she wants you to give her just enough information for her to go and find out...find it... she enjoys that. Finding it on her own.

The mother of another participant, Sam, stated that she completes most of her homework on her own. When asked about his levels of maturity and independence, Jay's mother responded, "I usually don't have to tell him to do too much. He's kind of an independent kind of child. He'll take the initiative and go." Asked the same question, Matthew's mother stated, "My son is immature compared to other students in some ways, but being the oldest of four children, he handles responsibility well. He is very independent... he tries to be too independent some times." The response given by Johnny's mother mirrors the beliefs of the other parents, "I would say he's quite independent."

Internal motivation is another student factor that appeared across case studies. Johnny's mother stated, "He is extremely motivated in that he spends several hours daily completing his work, seeking to keep it very accurate and complete. He is very dedicated." The participants in this study appeared to

be motivated internally, by the desire to make good grades. When asked what rewards were offered for completing homework, all five participants responded that their reward was making good grades. Teachers validated the important link between motivation and high achievement. During one interview, the teacher responded, "The low academic students often have a hard time focusing, and the high academic achievers are usually motivated." As a group, the teachers recognized that most students, even those who are highly motivated, dislike homework. According to one teacher interviewed, "Love and homework don't belong in the same sentence." Another teacher stated, "They don't really enjoy doing homework at all. I'm sorry, but they just don't. Most kids just don't really care for homework." The high levels of internal motivation exhibited by the five participants in this study, however, enable them to overcome the natural dislike for homework in order to reach high levels of achievement, defined by the students as "good grades."

Structure in the home has already been discussed as an important element of the parental involvement style of facilitative supervision. Interviews and observations, however, also revealed that each of the five participants had an internalized system of structure. This leads the researchers to believe that highly structured homes and the modeling of systems of time management by the parents contribute to the development of structured behavior in high-achieving middle school students. An at home observation of one participant reveals the high level of structure and self-management that she possesses:

She is sitting on the bed, organizing her study materials, and deciding what assignment to begin working on first. She refers to her planner to verify the assignments, arranges her books, and pulls out a pencil pouch. She selects the science reading and chapter question assignment. She appears very focused on the task at hand. She is decisive about what assignment to work on first (science) and is organized and methodical.

She reads silently, with great concentration. The reading assignment appears to cover approximately 8 pages. Her lips move slightly as she reads. There are soft sounds in the background from the other children in the house. The television is on in the den, and its noise is barely audible in her room.

Theme 3: Agreement Regarding the Purpose and Characteristics of Homework

Finally, the third theme emerging from the data analyses is that there is agreement among students, parents, and teachers regarding the purpose and characteristics of homework at the middle school level. The data show consistency between interviews, observations, and document analyses regarding the purpose, frequency, duration, and quality of homework.

The purpose of homework was broadly regarded by teachers, parents, and students to be a tool to reinforce the concepts and material presented in class. There was consistent agreement between all three data collection methods (interview, observation, and documents) as well as between all three groups involved in the study (students, teachers, and parents) about the perceived purpose of homework.

There was less agreement among participants regarding the frequency of science homework assignments. According to Kathy and her teacher, she has science homework once a week. Kathy's mother, however, reported that she has homework 2-3 times each week. The interview transcript with the teacher helps to explain this discrepancy; Kathy's teacher explains that she assigns the homework for the entire week on Monday (once a week) and that the students have until Friday to complete it.

Therefore, students may be working on that homework more than one night each week, while it is assigned only once. Similar small discrepancies existed with the other participants in this study.

Likewise, the duration of science homework was perceived differently by students, parents, and teachers. The most common discrepancy in perception was that teachers assumed that homework would take longer than it actually takes students to complete. One participant, Johnny, actually takes longer to complete his homework than both his parent and teacher perceive he should. According to his mother, "It should take 30 minutes to an hour per subject (understanding that not all subjects have homework each day)." His teacher anticipates that science homework should take approximately 15 minutes each night. Johnny, however, is excessively careful in the completion of his homework, often spending up to an hour on his science homework. Sam's student, parent, and teacher all agreed that homework should be about 15 minutes of review but thought that none should be given on Wednesday nights because of church commitments.

Finally, there was fairly consistent agreement regarding the quality of homework

produced by the participants in this study. Sam's teacher reflected that often she can tell which students have someone helping them by the quality of the work submitted. In Matthew's case, he, his mother, and his teacher all indicated that the quality of his homework depended on his interest in the assignment. Document analyses provided substantiation of the quality of the work produced by all five participants in this study. While the quality of work between students varied from excellent to average-above average, there was consistency within participant groups (student, parent, and teacher) as to the perceived quality of that participant's work. In the case of Johnny, his desire to produce high quality work leads him to spend an excessive amount of time trying to make it correct. His mother agrees that he is very careful when doing his homework and that he spends too much time working on his homework.

Discussions, Conclusions, Implications

Much research has been devoted both to the importance of gender issues in educational settings and to the impact of parental involvement on student achievement. This study combined the two areas as we developed individual case studies that examined teacher perspectives, student (both male and female) achievement, and parental involvement.

The conclusions reached in this study are somewhat contradictory to the initial literary reviews. Although most cited research (Mau and Lynn, 2000; Xu, 2005; Debacher and Nelson, 2000; Sawyer et al. 2005) indicated significant gender-related associations between homework and school achievement, our study does not support the gender connection. This study also sought to establish a correlation between parental involvement and student achievement, a variance discussed in studies such as those by Carter and Wojtkiewicz (2000), Shymansky (2000), and Xu (2003). Although Carter and Wojtkiewicz (2000) reported more consistent parental involvement with daughters than sons, our research findings emphasize the importance of parental supervision for any gender, thus supporting Xu's conclusion (2003) that the family indeed plays a positive role in homework and subsequent academic success.

As previously reported, this study addresses specific research concerns related to high-achieving middle school science students: parental involvement characteristics, parental involvement factors, and

homework purpose perception. Consistency in controlled factors such as family structure, family income, parental educational levels, and parental expectations encouraged reliable results in study findings. One major factor, however, proved problematic: limited observation opportunities. The small group

situation afforded very little time with each subject in his learning environment, thereby allowing only one class and one home observation and only one interview with each teacher, parent, and child. Because of this limited number of visits, the researcher was possibly given an idealistic representation, rather than a realistic portrayal, of the classroom and the home setting.

Despite these limitations, our research findings are reasonable and relevant. Since our purpose was to learn more about the relationships among student achievement, gender, parental involvement, and homework, our research findings indicate success.

“Among high-achieving middle school science students, what characteristics of parental involvement in homework exist?”

This study supports earlier findings that parental involvement, especially facilitative supervision, is a strong determinant in a middle school student’s academic success. All case studies substantiate the need for structure and schedule in the home environment with parents assuming a managerial role as they provide a comfortable setting and any needed educational tools. This study also proves that high-achieving middle school students are generally independent, motivated, and structured, characteristics recognized in all case study student participants.

“Among high-achieving middle school science students, what factors influence parental involvement in homework (e.g., gender, socioeconomic status, age/developmental stage, parent education level)?

Our limited participant base pool represents a fraction of middle school high achieving students from various backgrounds and ethnic groups, yet some definite conclusions can be drawn. First of all, gender differences do not significantly affect academic achievement in middle school, specifically seventh grade science settings. Teachers generally agree that academic achievement is based on performance rather than gender; any male/female discrepancies are more directly related to individual maturity than to sex. Some teacher predispositions, as addressed in one of the case studies, prove that some educators make serious assumptions about boy vs. girl achievement; perhaps additional research will prove that the individual student is responsible for his/her success and will encourage the teacher to “teach to the student” regardless of the student’s sex. In addition, the importance of parental participation is unquestionable. Since all of the parental participants in our study were post-secondary graduates (some with advanced degrees) and had relatively high family incomes, the socioeconomic level or parent educational level could not be addressed as a determining factor. More diversified research would help determine if the impact of parental involvement is relative to education and income.

“How do parent, teacher, and student perceptions differ regarding the purpose of science homework?”

Finally, this study emphasizes the common perception (by students, teachers, and parents) of homework as both a reinforcement and an enrichment tool since all agree that homework is necessary and that it should be completed with care and accuracy. Three of the five student participants

described homework as an extension of class, practices that would help them “understand” and “reinforce” what they had been taught in class; three of the parents used the term “practice” and one used “reinforce” when discussing homework. Teachers, according to our study, generally overestimate the time needed to complete the assignments, calling attention once again to the inner motivations of the high-achieving students and their abilities to comprehend and apply the material.

In conclusion, gender division is an important educational issue since much consideration is now being given to gender separation and its impact on educational success. Any research related to student achievement is invaluable. We certainly have not answered all questions, so many opportunities exist for further research into gender implications and parental participation. A great deal of consideration is given to children with special needs, but high achievers are often overlooked because we believe that they will succeed in spite of the educational system. Understanding these students’ motivations for success will certainly help educators apply the same teaching tools to all students. In addition, encouraging parental involvement on any level has positive benefits. The end goal, then, should be keeping the parental involvement active. Therefore, any completed research simply encourages more research that will assist educators and parents in providing a supportive educational atmosphere.

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